A Study of
AMERICA'S TOP
CORPORATE INNOVATORS

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A TALIGENT WHITE PAPER

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Introduction and Description of the Study

Taligent background

Taligent Inc., founded in March 1992 as an independent joint venture of Apple Computer Inc. and IBM Corporation™, is developing an exciting new technology foundation that will usher in the next wave of computing. Uniting a multi-year internal Apple® project, codenamed "Pink," with some of IBM's most advanced technologies, the company represents a historic collaboration between two computer industry leaders.

Taligent is developing an exciting new technology foundation that will usher in the next wave of computing.

Taligent's open, extensible system software platform will have far greater scope than a traditional operating system. Built completely with object-oriented technology, this platform will offer a new computing environment that will accelerate the pace of innovation by systems and software vendors at all levels of the industry.

Dedicated to improving desktop computing for end-users and making independent and corporate developers more productive, Taligent's charter is to generate side support for its new platform. The company will license, market and support its technology worldwide to software companies and hardware and systems vendors. Partnerships and cooperation, within the industry and with customers, are key to Taligent's strategy and critical to delivering meaningful solutions to end-user problems.

Looking into the crystal ball with innovative companies

Taligent™ recognizes that a clear focus on real-world, customer-defined problems is the starting point for stimulating industry innovation. But how will innovation be defined over the next decade? To answer these questions and crystallize a vision of the future, Taligent set out to study the most innovative companies it could find. In an unprecedented step, far in advance of its own product introduction, extensive insights were gathered that will have a profound impact on the continuing definition of Taligent's products...and the company itself. This was the genesis of the Corporate Innovators Study summarized in this paper.

The U.S.-based companies participating in this study were selected for their reputation and track record as innovators – in their products and services, and also as companies publicly recognized for the ability to apply technology to their businesses.

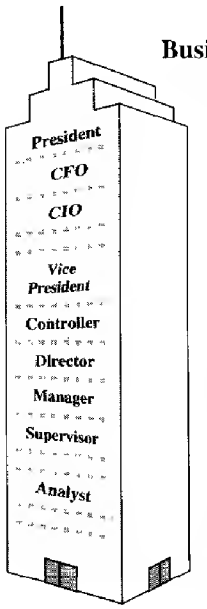
Study Participants

- **Bechtel:** Construction/Engineering
- **Boeing:** Aerospace
- **Bristol-Myers Squibb:** Pharmaceutical
- **Brooklyn Union Gas:** Utilities
- **Citibank:** Banking
- **Clorox:** Consumer Goods
- **Esprit de Corp.:** Apparel
- **Marriott:** Lodging/Hospitality
- **MCI:** Telecommunications
- **Procter & Gamble:** Consumer Goods
- **The Travelers:** Insurance
- **Union Pacific:** Transportation

The study explored each company's vision of the future in five key areas:

- Strategic business initiatives
- Information technology initiatives that support the business
- Most innovative current/future applications
- Impediments to leveraging technology
- Potential uses of emerging technologies

A cross-functional team of Taligent marketing and engineering staff conducted nearly 300 face-to-face interviews. The team spoke with professionals up and down the line, from senior executives to entry level employees. End-users were reached in virtually every operational area of the organization, as well as the critical IS staffs who help them apply technology to the business (see Business End-User and IS Interviews chart). Unlike more traditional studies based on telephone or mail surveys, these one-on-one interviews allowed Taligent to explore the subject areas with unprecedented breadth and depth.



Business End-User and IS Interviews

Functions interviewed:
Customer Service
Distribution
Engineering
Finance
Human Resources
IS
Manufacturing
Marketing
Operations
R&D
Sales
Trading

The involvement of end-users from so many functional areas added a fascinating viewpoint that is frequently omitted in similar market studies. This inclusiveness allowed Taligent to map end-user need against IS realities and executive perspectives, in an attempt to fairly represent these often divergent points of view.

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The following discussion represents just the "tip of the iceberg" – a distillation of more than a thousand pages of notes from the candid evaluations, insights and creative thinking offered by this group of innovators. Although time and space does not permit sharing all of the details, the highlights alone are enlightening, and well worth the read.

So why, after all this work, is Taligent willing to share this information with the industry? Because just as Taligent intends to openly license its technology, the company plans to share what it learns through the eyes of the customer. No one company can solve all the industry's problems. But in the spirit of collaboration, and with a common understanding of the marketplace, Taligent believes the software industry can deliver "whole product solutions" that address critical customer needs.

The insight gained into the business interests and technology directions of these large corporations is invaluable as Taligent solidifies its strategies. Large companies, one of Taligent's many future markets, are very important because they make highly innovative use of new technologies and exert significant influence on the industry at large. Additional Taligent studies are already underway to help illuminate other strategic markets and technology issues. These too will be shared in due course. For now, the reader is offered a fascinating glimpse into the crystal ball of these innovative companies.

Strategic Business Initiatives

Taligent believes that technology initiatives cannot exist independently, but must flow from the strategic demands of the business. Accordingly, the innovators were asked about the broad business initiatives they see driving their strategic decision making over the next

several years. While these companies represent a diverse set of industries, the initiatives that emerged from the study reflect a common set of priorities.

Presented here is a snapshot of the innovators' top six business initiatives, in order of priority.

Taligent believes that technology initiatives cannot exist independently, but must flow from the strategic demands of the business.

Reduce costs

Not surprisingly, cost reduction was number one on the list. A key management goal, cost containment is critical in today's recessionary business climate, when revenue growth alone is no longer viewed as sufficient. Although most of these companies have been pursuing lower costs from years, many think traditional techniques – downsizing, belt-tightening, outsourcing and selective divestiture – have reached their outer limits. Many believe new approaches such as re-engineering and Total Quality Management (TQM), which are closely linked to information technology, will be required to yield incremental savings.

Increase growth

Despite guarded expectations for growth at present, increasing growth and profitability remains a universal goal. Given an unsettled economy and unpredictable consumer demand, many companies are concentrating less on traditional growth strategies such as building market share in existing businesses. Instead, many see better chances for growth by entering new markets and introducing new products and services.

Improve customer service

High on everyone's list was superior customer service. Customers are a company's most precious strategic asset – difficult to win and easily lost. Companies use service as a vehicle for delivering individualized customer programs, which require new customer-oriented metrics such as on-time delivery, order completeness or billing accuracy. The insight? Customer service is driving an increase in cooperation and alliances, in an effort to deliver "whole products" and seamless services to the end consumer.

Speed time to market

First is best. Grab early market (and mind) share to be recognized as the leader. But a striking concern, voiced by many, is that product delivery cycles are often longer than the market window of opportunity. The quick-to-market imperative is pursued in two ways. Internally, via process/technology initiatives: parallel and collaborative teams, task automation, re-engineering, rapid prototyping and TQM. Externally, through strategic partnerships and alliances, joint marketing and licensing agreements.

Move toward globalization

With domestic markets saturating, many of the innovators are already making operations and systems investments to support globalization. Companies are grappling with up-front technology choices, and working to address cultural issues. Most are looking for local partners rather than plunging into unfamiliar territory. The goal is global resource sharing – people, data, applications, technology – whatever it takes to address worldwide markets and achieve economies of scale.

Leveraging customer and supplier partnering

Consistent with improving customer service is a movement to develop tightly integrated customer and supplier relationships. Particularly in areas like inventory management and distribution, cooperation can ensure delivery of high-quality, lower-cost products without reducing profitability. Electronic Data Interchange and other technologies are increasingly reducing the boundaries between companies, their vendors and customers. As a result, companies are attempting for the first time to re-engineer business processes across the porous boundaries of these "extended enterprises."

Less frequently mentioned initiatives

Other strategic business initiatives under way in several companies include efforts to improve product profitability and better accommodate rapidly changing workforces. Finally, a few companies are striving to foster a more unified corporate image and are establishing processes for more systematic competitive information gathering.

Information Technology Initiatives

Having gained a solid understanding of these innovators' business issues, Taligent moved on to explore their strategic IT initiatives. While companies did not always map these technology initiatives directly to their strategic business goals, in most cases correspondences are easy to see.

As before, the top initiatives are described below in descending order of priority. Many readers may be surprised at the weight given to end-user-focused initiatives, in contrast to lower levels of interest in other areas such as outsourcing or security, which appeared to be of lesser importance.

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Deliver end-user environments

The deployment of end-user technologies strives to put data in the hands of decision makers, streamline business processes and improve responsiveness. Winning implementation strategies include graphical user interfaces, data access tools, visual development environments and groupware products. The prediction? End-users will climb the self-sufficiency curve – from addressing day-to-day reporting requests, to tailoring applications, to mastering the development of basic applications – themselves.

Leverage internal software

New business models are emerging as companies begin to leverage their technology investments both inside and outside the company. More than half of these innovators are recouping investments by commercially reselling internally development software to eager recipients both within and outside their own industries. *Corporate* value-added-resellers (VARs) and systems integrators? Absolutely. Other high-impact initiatives included early involvement with leading software/technology vendors to "stay ahead of the curve," and participation in technical consortia to reduce the individual risk of working at the leading edge.

Deploy client/server environments

Many of the innovators are aggressively pursuing client/server initiatives, have business-critical applications in place, and appear to be well ahead of the industry curve. They claim that the benefits clearly outweigh the challenges, citing both the cost benefits of workstation price/performance gains and the improved flexibility and responsiveness to business needs and user requests.

Customer service and sales automation initiatives

Customer information systems are integral to superior customer service, supporting timelier inquiry, response and problem resolution. A parallel initiative, sales force automation, aims to increase sales productivity and improve customer service. These sales efforts are driving the current deployment of laptops as a customer tool, with plans for other technologies including hand-held devices and pen-based computers. The big story? Mobile computing will foster stronger customer relationships by putting customer-specific data in the hands of remote decision makers.

Strategic planning, global systems, re-engineering

About half the innovators cited these three initiatives as central to their IT strategy. Strategic plans typically lay out a five-year roadmap, and for the first time are

successfully integrating business goals and IT plans. Global technology infrastructures, initially driven by just-in-time inventory control, quick-response and e-mail applications, are important to companies with significant multinational operations. And, business process re-engineering and the corresponding systems implementations are on the hot list for companies that have reached the limits in downsizing and other cost-control measures.

Less frequently mentioned initiatives

Surprisingly, CASE and TQM initiatives were mentioned by less than half the participants. CASE has not been widely successful, despite significant investments in tools and training. TQM is typically tied to continuous improvement as a way to deliver better customer service and quality products. A number of technology initiatives, reflective of 1980's trends, were mentioned only sporadically: outsourcing, electronic software distribution, and data center/network consolidation appear to be of less interest to this group of innovators as they press on to attack new challenges and opportunities.

Today's Information Technology Environments

Many readers will recognize the environments highlighted in this section. Why? Because these innovative companies, committed as they are to technological progress, are struggling with the same complex environments that prevail throughout the corporate community.

Complexity squared

Highly heterogeneous environments mix IBM PS/2™ or compatibles, Apple Macintosh™, UNIX™ workstations, a considerable number of 3270™ "dumb" terminals ... and the list goes on. In a nutshell, name it – they've got it. What's more, this melange only complicates future investment decisions, as well as the critical sharing of data and applications among users.

These innovative companies, committed as they are to technological progress, are struggling with the same complex environments that prevail throughout the corporate community.

Mainframe inertia

Distributed computing is not yet a reality. Despite significant efforts to move toward distributed environments, a great percentage of mission-critical applications remain tied to mainframes – and will be for years to come.

Desktop globalization?

A nearly 1:1 ratio of desktop computers to employees poses a number of support and asset management challenges. Even among these innovators, connectivity is sporadic: many departmental LANs, some WANs. Enterprise – even global – networking is a common goal, but not widely accomplished. Watch for worldwide networking initiatives to emerge, enabling new global business processes.

Make or buy?

"Make" versus "buy" decisions for applications development continue to challenge the innovators. The scarcity of business-critical software in the commercial marketplace forces companies to spend significant time and effort building or customizing applications in-house. Would they buy *as is* if the right software were out there? Absolutely.

Emerging Technologies

For the Taligent team, the best part of the interviews came when the innovators brainstormed future uses of emerging technologies. Participants were asked to put all barriers aside and paint a picture of the future. Industry experts are often skeptical about users' ability to envision and describe new, innovative applications, but judging from the stories they weaved, the experts may be surprised!

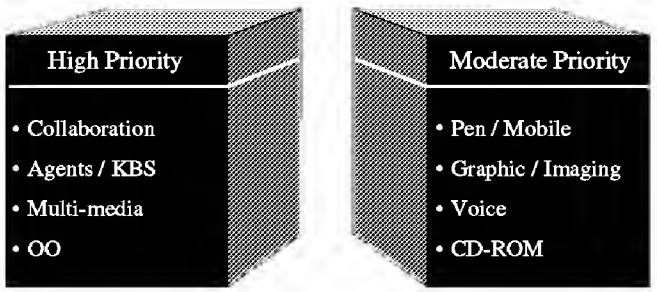
Participants were asked to put all barriers aside and paint a picture of the future. The emerging technologies are ranked by the innovators based on their importance to the business.

How are these companies keeping pace with the dizzying array of emerging technologies? Several have chartered in-house advanced technology groups to explore and disseminate new technologies. Others host periodic technology forums open to both their IS staff and business end-users. One company even formed a team of "scouts" to train key staff in new technologies and then empower them to identify application targets within the business units.

In most cases these innovators are actively using outside experts to keep a finger on the pulse of emerging technologies. Approaches range from partnering with advanced technology vendors, to working with universities, to attending industry conferences, to working with analysts tracking emerging technologies.

Although cautious about the present maturity and supportability of emerging technologies, the companies' general view is highly optimistic. They see broad benefits down the road: streamlined processes yielding shorter time to market and better-quality products and services; better use of data and transparent access driving improved decision making; support for globalization enabling stronger customer relationships. In short, these companies are quite willing to work with emerging technologies even in their infancy, because of their ability to drive competitive business advantage.

Companies Rated the Importance of Select Emerging Technologies



The emerging technologies are described below, as ranked by the innovators, based on their importance to the business. The Taligent team was particularly interested in probing why the participants believe these new technologies will be more or less critical to their company's future. And, as the Emerging Technologies chart illustrates, there was a clear distinction between higher and moderate priority groups.

Collaboration

This top-ranked technology is expected to become a pervasive way of conducting business, both internally and externally. The interest in collaboration reflects a strong orientation toward cross-functional workgroups, especially in global and geographically dispersed companies. As re-engineering gains momentum and global workload balancing becomes imperative, the leaner, flatter organizations of the 1990's will depend heavily on workgroup collaboration and seamless information exchange.

Companies noted that they expect queuing and routing applications such as workflow or project management to become pervasive ahead of real-time collaboration applications, largely due to users' comfort working independently at the desktop. "Virtual teams," though, will be the big hit of the future, for concurrent engineering, business and customer teams. From an inter-business perspective, this concept offers a significant opportunity to work more closely with customers, vendors, suppliers and agencies.

"Agents"/knowledge-based systems

Despite the 1980's "hype" and resulting skepticism surrounding artificial intelligence and expert systems, their 1990's successors, agents and knowledge-based systems, have earned a high degree of interest and usage – and are dropping dollars to the bottom line. This interest traces largely to the desire to better manage, navigate and act upon growing volumes of enterprise data. These knowledge-based technologies are most often applied to predictive modeling, and agents or case-based reasoning, for filtering and exception reporting.

The innovators described applications spanning their organizations: in sales and marketing, to drive customer knowledge down to a micro level; in manufacturing and operations, for inventory control, logistics planning and a host of volume and production forecasting activities; and in IS, for systems and network management, applications development and a range of help desk functions.

Multi-media

Taligent was pleasantly surprised to find these companies well beyond the conventional view of multi-media as primarily a training technology. Most predominant in consumer businesses and manufacturing operations, this technology is expected to enable the next-generation user interface. Where views were mixed, they appeared to trace back to the poor job some vendors have done demonstrating business-critical use.

In addition to computer-based training, key uses for multi-media fell into three categories: customer-oriented applications, design and merchandising, and manufacturing. For customers, sales and marketing staffs will apply multi-media to presentations, proposals, profiling and information services. In design and merchandising, multi-media will spur the on-line development of packaging, product animation and catalogs, and be featured in interactive displays. And finally, from plant floors to maintenance bays, multi-media will support diagnostics and repair through interactive self-paced modules.

Object-oriented technologies

The object technology wave has begun. Given Taligent's commitment to OO, it was inspiring to find almost half the innovators already applying OO technologies to business-critical applications. This activity is driven by the belief that OO will significantly ease the software development process, with hopes for re-use as the long-term motivation. Although the learning curve can be steep, one developer's remark reflect the views of many: "I don't know why we ever used any other approach." A more detailed discussion of OO appears in the next section.

Pen

A number of innovators cited the intuitive paper/pencil metaphor of the pen interface as the next breakthrough to turn computer resisters into computer users. Conversely, several companies that had tested pen systems expressed some disappointment in the technology and the lack of compelling applications. Popular forms-based field usage will include sales call and activity reporting, order generation and tracking, and even emergency site inspection for operations and engineering. Other on-site applications range from sketching and customer mapping to pen-based annotation.

Graphics

Participants stated that beyond today's ubiquitous charting uses, graphics have great potential for visualizing complex data relationships. Especially as 3-D graphics become more pervasive, graphics will be critical for information-intensive professionals needing to extract meaning quickly from huge data sets – where "minutes can be worth millions." Other uses cited include a range of presentation graphics, and mapping for facilities and management, customer segmentation and geographic targeting.

Imaging

Interest was highest when describing the need to exchange technical or scientific images; in other contexts, imaging is generally not viewed as business-critical. Applications are

expected to emerge as imaging transmission techniques improve, costs come down, and integration into multi-media-based document management systems becomes more widespread. The most frequently mentioned uses are for archiving of documents, research and presentations, or customer correspondence, request handling and overall service enhancements.

Voice

This area is typically seen as less critical than other technologies, although many companies are currently using voice response for customer service, order status and telemarketing. Probably the biggest opportunity is for voice recognition, but at this point it seemed a bit "far out" for the group at large. Still, the innovators eagerly await the maturation of this technology, citing Apple's Knowledge Navigator™ vision as the ultimate goal – where talking to the computer for dictation, data entry or desktop navigation is as natural as sitting down with a personal assistant.

CD-ROM

Most of the companies' experience with CD-ROM is with information vendors, delivering Moody's™ or Compustat™ data, 10K reports, phone books or other voluminous information. There is some usage for intermediate data storage, but the real potential of CD-ROM lies in the area of customer information delivery and its use as an electronic publishing medium for digital data. This is expected to take numerous forms, from the delivery of customer billing and product information, to repair and service manuals, to software upgrades.

While the above-mentioned technologies elicited the richest descriptions, other emerging technologies are worthy of mention. Nearly every company expressed interest in massively parallel processing technology as a way to surpass mainframe power. And, somewhat surprisingly, a number of companies foresee business-critical use of virtual reality.

Object-Oriented Technology

Although object-oriented technology was not a specific focus of this study, the learnings were so interesting that Taligent felt this topic deserved its own section. OO appears to be gaining momentum, with several companies already building applications and others showing interest in rapid skills development. Even more fascinating was the spectrum of experience and interest, as depicted in the OO Outlook chart.

OO appears to be gaining momentum, with several companies already building applications and others showing interest in rapid skills development.

Companies can be clustered into three groups:

- ***Little to no activity*** Four companies fit this category. They are reading about OO, but not yet engaged in any OO development activity. At most, one or two small prototypes were found in pockets of the organization.
- ***Research and pilots*** Three companies are at the active investigation stage. They have assigned OO "watchdogs" and are identifying pilot projects based on extensive research.
- ***Business-critical development*** The remaining six companies are making business-critical use of OO. Their experience ranges from OO analysis and design of enterprise models, to multiple prototypes, to in-use production applications that are central to business operations. At the far end of the scale, a couple of innovators have obtained management support to deploy OO broadly within the enterprise.

So, what are these companies doing with OO? Initiatives in the works spanned a range of functions: in manufacturing and engineering, applications from process workflow and concurrent engineering to computer-integrated manufacturing and simulation; in customer service, applications for inquiry handling and tracking, billing and information systems; in the financial arena, for "what if" modeling, strategic planning and securities trading.

Real-World Scenarios

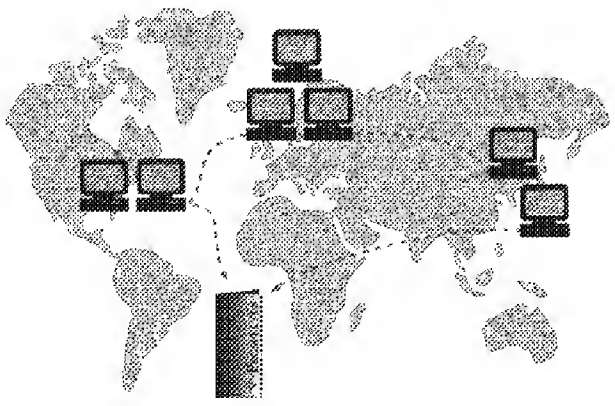
So companies lack vision for the use of emerging technologies? Nonsense! One of the most provocative techniques used during these emerging technology discussions was to ask the participants to "tell us a story..." In this spirit, here are two real-world scenarios as described by the study participants.

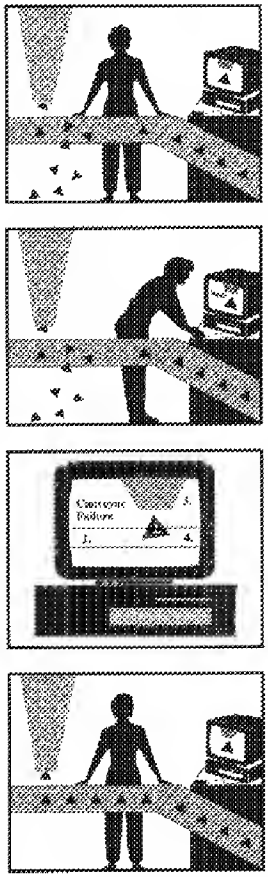
Worldwide account management through collaboration

Offering seamless financial services for multi-national clients is a major challenge. Geographically dispersed teams, scattered around the globe, must grapple with multiple languages and cultures, and collaborate over numerous time zones.

The client of an international banking and financial services firm is floating a bond for overseas and domestic investment. Over its global network, the firm's offices in different countries need to collaborate to construct the bond offering document. This collaboration requires real-time group authoring of documents in multiple languages, and passing critical market data and analysis in workflow fashion. Ultimately, each office provides specific risk assessments for investors in the countries it serves. The final document is built collaboratively, on-line, by the global account team.

This eliminates the time-consuming delays currently caused by manual document assembly, combined with the need to mail information back and forth internationally. Through on-line collaboration a precise, comprehensive bond offering for domestic and overseas investment can be assembled and updated in a timely fashion.



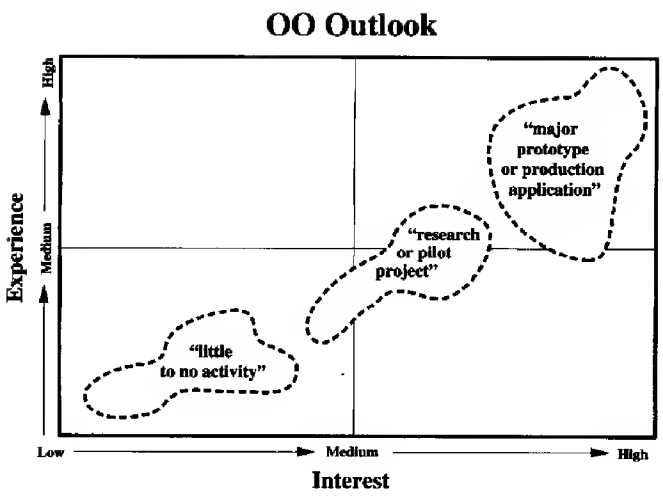


Multi-media supporting plant floor repair

A great attraction of multi-media is its ability to support employees who learn and retain information more easily through visual and audible aids than by reading. This attribute has helped to propel multi-media from the training room onto plant floors and maintenance bays. This usage is expected to move from stand-alone solutions to full integration with plant floor automation and other just-in-time manufacturing systems.

In this scenario, a production line conveyor belt breaks, halting an entire section of the line. Using a nearby workstation that supports line repair, process safety and spare parts lists, a plant worker brings up the multi-media module on conveyor repair. This module contains "branching" options that allow the user to choose the level of guidance appropriate to the employee's expertise, from a quick trouble-shoot to a thorough step-by-step walkthrough. Opting for the latter, the operator moves methodically through the repair process, guided by a combination of video, animation and voice instruction.

Unlike today, when the need to call in a specialist often causes extended downtime unacceptable in a just-in-time manufacturing environment, the multi-media module allows the problems to be fixed in minutes.



The divergence in OO experience among such innovative companies was striking. What makes a company more or less likely to be an early adopter of OO? While it was difficult to establish any direct causal relationships, several characteristics were identified that tend to describe the early OO adopters:

- Management views technology as key to attaining competitive advantage
- Robust work often in information-intensive or engineering-driven organizations
- Time-to-market imperative
- Software development is considered central to the business
- Tendency to follow a "make" vs. "buy" philosophy for applications development
- Business-critical applications moving off the mainframe, tending toward client/server

Companies noted that many of the challenges inherent in adopting OO mirror those faced by developers trying to improve their software engineering practices. The impediment specific to OO are primarily cultural, and reflect the long learning curve to become familiar with the technology. In fact, organizational challenges typically dominated these conversations, versus discussions of the maturity of the technology itself.

Impediments notwithstanding, the majority of senior IS executives believe OO will revolutionize the development, support and enhancement of applications. As a result, they are rapidly beginning to invest in training and targeting applications for proof-of-concept.

The discussions of OO with these innovators were rigorous and far-reaching. All of them are looking for the lessons learned from other large implementations, to help maximize the success of their future projects. Based on the significance of this topic to Taligent, to these innovators, and to corporate developers as a whole, Taligent is committed to educating the marketplace on companies' experiences applying OO in the business environment. By continuing to share these OO early adopters' "lessons learned," Taligent can help other companies get through the cultural shift involved in the adoption of this new technology.

Information Technology Impediments

Anyone involved with information technology, as a vendor, information systems professional or end-user, has more than once come face-to-face with the frustrations and roadblocks that too often impede the ability to apply technology effectively to the business. Not only do these impediments hamper today's business environment; they also impede the assimilation of emerging technologies and the development of emerging technologies and the development of the next generation of applications these corporate innovators envision so clearly.

These challenges take many forms. Some reflect internal corporate culture, others the way the software industry operates, and still others the inherent complexity of bringing technology into these highly dynamic business environments. The IT Impediments chart (on page 13) depicts the major categories as described by these companies.

The following is a snapshot of the obstacles the participants are struggling to overcome. Their words were strong, the messages clear – so here is their perspective just as it was heard – in their own words.

Not only do these impediments hamper businesses today; they also impede the assimilation of the emerging technologies these corporate innovators envision so clearly.

Organizational / cultural

Surprisingly, organizational and cultural challenges often proved to be more formidable than the technology itself. Some interviewees identified a "generation gap" between senior management, who may not view technology as a competitive weapon, and younger professionals who "grew up with the technology" and are committed to it.

While many end-users think their IS groups don't grasp the business issues, IS people complain that users don't understand the limits and costs of technology. In one end-user's words, "we never seem to speak the same language...it's often like we don't work in the same company."

Applications development

Many companies are burdened with huge applications backlogs, often a year or longer – leading to intense end-user frustration. In addition, this backlog problem is frequently compounded by the lack of strategy for setting development priorities.

Companies are also experiencing enormous problems due to the lengthy applications development process, which is largely the result of poor software development methodologies and tools: "It takes nine to 12 months to deliver an application when the market opportunity is only six months; business opportunities shouldn't have to wait for software."

Another common impediment relates to the back end of the software life cycle – the maintenance burden – which consumes significant staff time and money: "Nearly 80 percent of our development staff is focused on maintenance, not new development. We want to see those figures reversed." Some companies estimate these costs are rising 20 percent annually: "We're starting to think people should be paid for *not* writing code..."

Interoperability

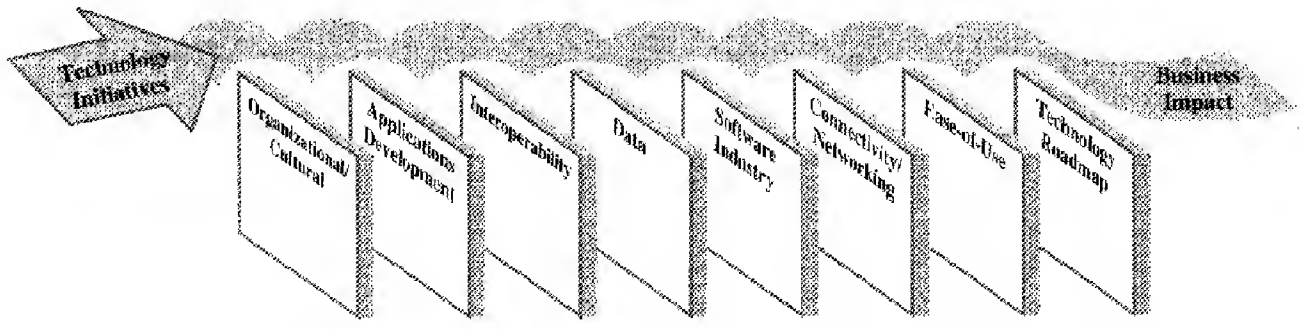
In many environments, a hodgepodge of hardware and software platforms impedes the work flow and even "strands" users at their desktops: "I can't even share a report on a disk within our department" is a typical complaint.

IS managers are also frustrated by the rapid pace of technology change and the difficulty of integrating existing systems and applications with new ones. One senior executive, echoing many of his peers, claimed, "The platform wars are impeding innovation and the deployment of information technologies to the business."

Data

Problems of managing data collection, access, integration and integrity are overwhelming in these heterogeneous environments. Users believe a large volume of information is "lost in the organization," and unproductive redundancy is rampant: "70 percent of the data and applications out there are duplicates."

Companies Described Impediments To Leveraging Technology



The avalanche of data clearly is not improving market responsiveness and decision making, and the lack of tools to navigate these data volumes means vitally important information may be missed: "We know a cure for cancer is in there [patient history database] if we just had the right tools to get to it."

Software industry

Many companies complain that the software industry is not delivering solutions to their business problems. As one CIO stated, "The shrink-wrap mentality is killing us. What we need are industry- and business-specific applications." What's more, the innovators take issue with software robustness – "we break shrink-wrap software" – and flexibility: "you can't have a flexible company with static software."

All this, in an industry where the technology explosion is paralyzing organizations unable to absorb the unrelenting pace of change. In one end-user's words, "Learning software is exhausting. Why should I get into a new package if it's out of favor in six months?"

Connectivity/networking

While networking is key to worldwide connectivity and global sharing, companies are concerned about the lack of network management and administration tools. They also anticipate problems with consistency and reliability as networks grow more dispersed: "We are more dependent on the network than any other part of our system."

As companies become more open, the need to balance security against extended enterprise access by customer/supplier "partners" is problematic. One participant noted that "security gets in the way of allowing divisions within the same company to communicate."

Ease of use

Many end-users felt that systems are still too hard to use, and were frustrated by the proliferation of packages and systems in their companies. Even the Windows™ and Macintosh™ interfaces "do not always reflect the way people work..." Said one participant, "Computers would be easier to use if the most critical functions were depicted as the biggest buttons at the top of the screen."

Another source of concern is the lack of high-level tools and training to help end-users become more self-sufficient in developing applications: "With the proper tools, users could handle 75 percent of the simple day-to-day requests themselves."

Technology roadmap

Participants stressed that new technologies do not properly address the legacy applications that run their businesses. One CIO noted, "Within that mainframe logic is a company; we can't just throw it out!" And in that same spirit, "We need to strike the term 'legacy system' from our vocabulary, and replace it with 'corporate asset.'"

With universal consistency, the innovators communicated that vendors are not providing needed roadmaps for the integration of their technologies into existing environments: "How we intake a new technology, and the guidance we receive from the vendor, is often more critical to success than the technology itself."

Taligent cannot provide solutions for all of these problems, nor can any single company. But Taligent and every company committed to the enormous potential of information technology must be aware of them, determine where it can make a difference, and work collectively to overcome them.

Implications For Taligent

As the reader has discovered by now, the months in the field with these innovative companies brought the Taligent team a wealth of insight into how information technology can and should be applied to the business. The learnings are having a profound effect on Taligent, its products, business strategy and approach to working with outside partners. And, it is hoped that by sharing this knowledge with others, these learnings will equally benefit the software industry at large.

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As Taligent reflects on these learnings, several key conclusions can be drawn which are noted below. All are important considerations for the industry as it works to accelerate the pace of innovation for the business and technology leaders of the 1990's and beyond.

Business change driving new technologies

As one senior executive so eloquently said, "Market forces will drive the success or failure of new technologies...only those with bottom-line business impact will survive." Whether it's redesigning business processes, accommodating a mobile workforce, or supporting global teams – the dynamic business climate will drive the emergence and acceptance of new technologies over the next decade.

OO as critical foundation technology

Taligent believes that object technology will be one of the core foundation technologies required to address the strategic business and technology issues of the "new business order." OO holds the promise of helping companies speed products to market, adapt to rapid change, and support an increasingly complex business environment. The challenge for Taligent, and the OO industry at large, will be to do everything possible to move companies up the learning curve and prepare the market for the advent of the OO era.

Industry participation required

As the innovators in this study so richly described, their needs and issues are diverse and substantial. No one company can possibly solve all of their problems, therefore, it is imperative that the industry come together – in a spirit of collaboration – to fulfill this vision of the future. This means independent software vendors, hardware vendors, systems integrators, VARs and corporate developers, all working together, must deliver the "whole product solutions" that meet end-user needs.

Taligent's commitment to customers

This study proves that customer know what they want, and can articulate this message with clarity. In Taligent's view, these are precisely the kind of customers Taligent needs to engage early on, to ensure that it delivers "industrial strength" products that are on target for this dynamic business environment. Taligent is deeply committed to a customer-centric approach, from both an internal and external business perspective. This means that Taligent will keep listening, and openly sharing the resulting insights with the industry, as the company moves forward.

On a personal note...

We have reached the end of this particular journey, which will continue to exert a profound influence on Taligent as we pursue our alliances, and ultimately, launch our products. From the creators of this study, Nancy Deyo, Joe Gillach and Bill Schmarzo, we extend our sincere thanks to the 295 people in 13 companies who generously shared with us their time and their insight – we couldn't have done it without you! To our readers in the industry, we hope you found this look into the innovators' crystal ball as fascinating as we did...and that you too will take the initiative to help make this selective vision a broad-based reality. •

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